

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 52.]

APRIL.

[1891.]

CXCV.—PERSIAN TOBACCO OR TOMBAK.

(*Nicotiana Tabacum*, L.)

A curious confusion has long existed as to the botanical identity of the tobacco plant cultivated in Persia. Flückiger and Hanbury in their *Pharmacographia*, one of the most accurate books ever published, remark (2nd ed., p. 469), "*Nicotiana persica*, Lindl., yields the tobacco of Shiraz." Bentley and Trimen, *Medicinal Plants*, vol. iii., sub. tab. 191, attribute Persian or Shiraz tobacco to the same species. These statements are adopted from the account and figure published by Lindley in the *Botanical Register* (tab. 1592). He says, "We are happy to have the opportunity of laying before our readers a genuine figure and description of the plant which produces the far-famed *Tobacco of Shiraz*. The common Virginian tobacco is also cultivated in Persia; but this it is from which the finest quality is manufactured. Seeds of it were brought from Persia by Sir Henry Willock, upon his return from his late residence at the Court of Ispahan, and communicated to the Horticultural Society, in whose garden it blossomed in September and October last."

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1891.

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Dunal, in his monograph of the Solanaceæ in De Candolle's *Prodromus* (vol. xiii. 1, p. 567), adopts Lindley's species with the remark, "celeberrimum tabacum e Shiraz producit." Yet, of the half a hundred species of *Nicotiana* which have been described, only two are ordinarily grown for smoking, namely, *Nicotiana Tabacum* and the more hardy yellow-flowered species, *N. rustica*.

A curious fact to start with is that under *N. persica* Lindley has redescribed a well-known species. As Alphonse De Candolle remarks (*L'Origine des Plantes Cultivées*, 2nd ed., p. 115), "Lindley has failed to observe that *N. persica* is precisely the same as *N. alata*, figured three years before by Link and Otto (*Icones plant. rar. Horti ber.* t. 32). This was raised from seeds sent by Sello from S. Brazil. It is a species certainly Brazilian, nearly allied to the Australian *N. suaveolens*. I am unable to offer an opinion as to how this species has been introduced into Persia. It must have been as a garden escape, or through seeds introduced by accident from America. It is improbable that its cultivation is common in Persia, for Olivier and Bruguère, as well as other naturalists, who have seen the cultivation of tobacco in that country, made no mention of *N. persica*."

The difference between the two plants is unmistakeable. *N. persica*, or, rather, *N. alata*, has white flowers, with a long slender tube, terminating in a nearly flat or salver-shaped limb, while the corolla of *N. Tabacum* is red, and funnel-shaped.

A *Nicotiana*, now much cultivated in gardens under the name of *N. affinis*, is probably only a cultivated form of *N. alata*.

As long ago as 1876 steps were taken to settle the point by procuring from Persia authentic seeds of Shiraz tobacco.

MR. W. TAYLOUR THOMSON TO ROYAL GARDENS, KEW.

MY DEAR SIR,

Tehran, 30th November 1876.

In accordance with a request received some time ago, I have much pleasure in sending you by to-day's mail a bag of the best Shiraz tobacco seed.

I have also received the instructions as to the sowing, watering, and growing them, but as there is no time in which to have them translated for sending by to-day's courier they shall be sent on by the first opportunity.

I am, &c.

Dr. J. Hooker, C.B.

(Signed) WM. TAYLOUR THOMSON.

The seed was grown at Kew, and largely distributed. It was undoubtedly "merely a form of *Nicotiana Tabacum*." This was stated in the Kew Report for 1877 (p. 40).

About ten years later attention began to be attracted to a mysterious article of commerce mentioned in consular and trade reports as *Tumbek*, or *Tombak*. The following extracts are taken from an interesting paper by Mr. E. M. Holmes, F.L.S., the Curator of the Museum of the Pharmaceutical Society, printed in the *Pharmaceutical Journal* for February 13, 1886 (p. 681).

TUMBEKI.

Tumbeki is the name under which an article of regular commerce between Persia and Turkey is mentioned in the consular reports, especially in that for Trebizond.

Two or three years ago an inquiry was made at this institution concerning the nature and botanical source of *tumbeki*, and the only information I was then able to give was that in the "Treasury of Botany" *tumbeki* is stated to be the narcotic leaf of a species of *lobelia*.

From its frequent occurrence in the Blue Books in the same list with tobacco, and from the large quantities mentioned as an export from Trebizond, my correspondent suggested that it was probably something used for smoking like tobacco. In the hope that *tumbeki* might prove to be some drug possessing important narcotic or possible medicinal properties, I wrote to Mr. A. Biliotti, Consul at Trebizond, for information. In reply, he forwarded samples of *tumbeki* of different growths and qualities. This proved on examination to be unquestionably some kind of tobacco, and being puzzled to know why it figured in the Blue Book as a distinct article, I asked Mr. Thomas Christy, F.L.S., to make inquiries for me in Persia. He received the following note through Mr. Zanni, the well known chemist at Constantinople, from whom I received the following information:—

"There are three qualities of the *teymbeki*, all derived from the *Nicotiana persica*.

"1. Shiraz *teymbeki*, valued at twenty gold piastres per oke.

"2. Kechan *teymbeki*, valued at ten gold piastres.

"3. Teheran *teymbeki*, equal in value to No. 2.

"The Shiraz is the best quality, the leaves are four decimetres long and half a decimetre wide. The leaves of the two other qualities are not so large. The quantity of alkaloid in the leaves of *teymbeki* is more than in the leaves of *Nicotiana Tabacum*; it is much used in Constantinople, but more so in Egypt, Syria, and particularly in Persia. *Teymbeki* is smoked in a special apparatus known as the *narghileh*. The apparatus is found in every coffee house and even in a great number of private houses. It resembles somewhat the wash bottle used in laboratories for washing filters with distilled water, but is often made of metal. The *teymbeki* is placed in a small reservoir on the top of the flask and burns in contact with a piece of incandescent charcoal. The vapour is drawn through the tube, which passes to the bottom of the water and collects above it, whence it is inhaled through the longer tube. It is in fact a water-pipe."

Having ascertained then that *tumbeki* was a species of tobacco, I sought for further confirmation of the statement that it is the produce of *N. persica*, and wrote on the subject to Professor Hausknecht, who is well known as one of the best authorities on the botany of Persia. He kindly replied as follows:—

"*Tumbeki* is the produce of *Nicotiana rustica*, and is almost exclusively used for the water-pipes called *kallian* or *narghileh*. The plant is cultivated throughout the whole of Persia, especially in Ispahan and Shiraz, whence the best kind comes."

But the statement of M. Zanni that *tumbeki* contains more alkaloid than tobacco, and that of Professor Hausknecht that *tumbeki* is the produce of *N. rustica*, seemed to conflict with the statements in books that *N. rustica* is less active than *N. Tabacum*.

In the "Commercial Report," No. 25, 1883, p. 1056, under "Smyrna," Consul Dennis confirms M. Zanni's statement concerning *tumbeki*. He

says:—"It is much stronger than ordinary tobacco, and cannot be smoked in the usual way, therefore it is exclusively used for the 'narghili.' He also adds that a large quantity is consumed in the district of Smyrna, but much is also re-exported to Egypt and other parts of Turkey. It is imported from Persia, both through Trebizond and Bushire on the Persian Gulf.

Mr. J. B. Fraser, in his work on Persia (1826), remarks, "The tobacco smoked in the kalia is called *tumbaku* in distinction to *tootoon*, or that smoked in pipes or cigarettes. It is sold in the leaf, which is packed dry in layers, and is preserved in bags sewn up in raw hide. It improves by age, but is quite unsmokable the first year. The best comes from Jaroum, south of Shiraz."

In an interesting article in "Harper's Magazine" (January, 1886, p. 224) on the "Domestic and Court Customs of Persia," the writer remarks concerning tumbeki: "The kaliân or water-pipe differs from the Turkish narghileh by having a short straight stem. In it is smoked the tobacco called tumbakee—a species grown only in Persia. That of Shiraz is very delicate in flavour and is the best. The *tumbakee* must be first soaked in water and squeezed liked a sponge or it will cause vertigo. A live coal, made from the root of the vine, is placed on the tobacco, and the smoke is drawn through the water with a gentle inhaling, depositing the oil in its passage through the water."

The leaves of tumbeki which I have received from Trebizond and Constantinople both correspond with *N. persica* in character, but not with *N. rustica*, since they have no trace of a petiole. So far as it is possible to ascertain, therefore, in the absence of flowers, the weight of evidence is in favour of tumbeki being the produce of *N. persica*."

A sample of Shiraz *tumbeki* was submitted to chemical examination by Messrs. Ernest J. Eastes and Walter H. Ince (Pharm. Journ., l.c., p. 683), with the following results:—

Nicotine	-	-	-	5.835
Saccharoid matter	-	-	-	3.355
Saccharoid matter after Pb treatment	-	-	-	3.49
Soluble in water	-	-	-	55.6
Insoluble in water	-	-	-	44.4
Ash	-	-	-	26.15

The following further account appeared in the Journal of the Society of Arts for August 9, 1889, p. 744.

PRODUCTION OF PERSIAN TOMBAC.

"This narcotic, which is known under the name of *Nicotiana persica*, is cultivated in Persia exclusively, in the provinces of Chiraz, Kechan, and Ispahan. Its quality varies with the place of production. The best *tombak* is that which is derived from Chiraz. The production of this province varies between 1,500 and 2,000 bales a year, which is almost entirely consumed by members of the Imperial family. The *Journal de la Chambre de Commerce de Constantinople* says that *tombak* of this superior quality is not very abundant, and the price paid for it is about fifty or sixty francs the oke, the oke being equivalent to 2.8 lbs. avoirdupois. The province of Kechan produces the second quality of Persian *tombak*. With small leaves like the Chiraz *tombak*, the product of Kechan is not even so abundant. The province of Ispahan is the centre of the product for exportation. Its cultivation is

carried on on a large scale, and the plant, which has a large leaf, forms the third quality of Persian *tombak*. It has been vainly endeavoured to grow this plant in other localities of Persia and Turkey, and experiments which have been made in growing Chiraz *tombak* in the districts of Ispahan and Kechan have not been attended with successful results. This is attributed to the quality of the soil. *Tombak*, which is used in the same way as tobacco, is cultivated in a manner almost identical with that followed in tobacco cultivation. The seeds are sown in the month of May, and as soon as the young plants have attained a height of from fifteen to twenty centimetres they are watered once a fortnight. The harvest takes place in September or December, when the leaves are cut and spread upon the ground, where they are exposed to the dew for a period of forty-eight hours, and to this exposure they owe the fact of their being slightly stained with little black patches on the leaves. When carried to the warehouses the leaves are piled one upon the other. A slight smoking to which they are subjected in the warehouses gives to the leaves a greenish tint. The warehouses are then carefully closed so as to exclude all air, and at the expiration of a fortnight the leaves are sorted and packed. In the latter operation the following is the method employed:—After having separated the leaves one by one, they are placed one upon the other, and pressed in bundles of from forty to forty-two oaks. They are then wrapped in pieces of American cloth, which are stretched and sewn up in the form of bales, called *torba*. These *torba*, which are covered with sheepskins, half dressed, are then ready for delivery to the trade. *Tombak* in good condition, packed in bales, and warehoused in places not too dry, may be kept without any deterioration for several years."

It seemed worth while, as the results of Mr. Holmes's inquiries had not proved absolutely conclusive, to make further inquiries. An application to Her Majesty's Legation at Tehran led to the following correspondence.

Dr. CASSON to ROYAL GARDENS, KEW.

Her Majesty's Legation, Tehran,
3rd March 1890.

DEAR SIR,

I HAVE to-day received your letter respecting the *tumbaki*. I was engaged at the moment in smoking some Shiraz *tumbaki*, which is by far the best to be found here, in my callian or water-pipe. My own impression is that it is simply a form of tobacco. I will do my best to obtain you seeds and leaves of each variety, and send them by messenger to the Foreign Office for you. I will also lay myself out to gather all possible information respecting the plant.

I am, &c.

D. Morris, Esq.

(Signed) J. HORNSEY CASSON.

Dr. CASSON to ROYAL GARDENS, KEW.

MY DEAR SIR,

Tehran, 17th May 1890.

I SEND you herewith such information respecting Persian *Tanbaku* as I have been able to collect at present. Later on I hope to send you the specimens promised, and I also append information and specimens from the Ispahan district.

I am, &c.

D. Morris, Esq.

(Signed) J. HORNSEY CASSON.

TUNBAKU OR TUMBAKU.

Her Majesty's Legation, Tehran,
16th May 1890.

The following interesting particulars with regard to the cultivation, &c. of the tunbaku plant have been kindly furnished by the Nawab Haider Ali Khan, British agent at Shiraz. A translation, as nearly as possible literal, of the original Persian of his communication is here given. Hākān and Lars, from which the samples most in request by the higher class Persians come, are both in the immediate neighbourhood of Shiraz, from whence the Nawab promises to send in the autumn specimens of leaves, flowers, and seed, with samples of the soil and water. On receipt of these I will forward them at once to Kew. I append also an abstract of information on the same subject afforded me by Mr. Wright, the English head gardener of H.I.H. the Zil-é-Sultan.

J. HORNSEY CASSON.

[Enclosure I.]

About the beginning of February the seed is sown broadcast on the ground, which is first ploughed and reploughed two or three times, and well manured, mixed animal manures and nightsoil being used for this purpose. Ridges, about a yard apart, are made, and the intervening furrows are flooded, and while the water still remains on the ground the sowing takes place. One and a half "mands" (one mand = $6\frac{1}{2}$ lbs.) of seed are used on the same extent of land as would be sown with five (5) mand of wheat. The seed sinks with the water into the ground, which is then covered thickly over with camel-thorn as a protection principally against birds. When the plants begin to show above ground they must be watered once a week, so that the ground remains slightly moist. Later on the watering must be continued every second week until about the 10th of April, when the thorn is removed. The ground is then weeded and bat and pigeon manure is scattered broadcast over it. About the commencement of May the transplantation into other ground is effected. Old fallow land should be selected; two consecutive crops of good *tunbaku* cannot be expected. The course generally adopted is to plant *tunbaku* one year, wheat the following, and the third year the land is left fallow. The ground must be reploughed four or five times and arranged in ridges and furrows (Pūshteh vé Lūleh), the latter being flooded, leaving the crests of the ridges dry. The transplants are then put in at the water-line about eight (8) inches apart, and a week later the ground is again flooded, which process is repeated the second time after an interval of two weeks, and again continued weekly until the plants attain the height of about one yard. The crowns are then cut off, leaving five or six good leaves. After the cutting, smaller leaves begin to sprout, and these must be cut away, the larger and thicker the leaves, the better the *tunbaku*.

At the middle of "Zibra" (about the first week of October), the maturity is known by the appearance of red spots on the leaves, which also crackle on pressure between the fingers. The ground is again flooded, and the plants are cut off near the root, the stalks being again stuck into the ground at the water-line, the leaves remaining dry above ground. When the prickles on the leaves are quite dry, the ground

is once more flooded. Next day when the water has well subsided, and the mud is beginning to dry up, the plants are pulled up and thrown into the furrows, where they are left for about 24 hours. Before sunrise the following morning they are collected and removed into a shady place, *e.g.*, into tents, where the leaves are separated from the stalks as rapidly as possible before drying takes place. A pit about two yards square is made, and the leaves, arranged in layers, the stalks being placed on the top as a protection against the sun, are firmly trodden in. Ten to fifteen days later they are taken out and spread over the floor of a store-room, where they are well turned over for two or three days, and in this manner carefully dried. They are then closely packed into canvas bags, which are generally cased over with skins for protection during transport. Tobacco seeds of cold countries will grow in hot climates, and vice versa. The points most to be considered are the water, soil, and climate. In all good *tanbaku* districts either the water or the soil, or both, are brackish or salt (*shūr*). The peculiar aroma most appreciated by Persians is only to be obtained by growth in warm climates. The produce from the non-brackish districts is exported and not relished for home consumption. *Tūtūn*, pipe tobacco, and *tanbaku*, are two different plants, but the cultivation is the same. *Tūtūn* can never become *tanbaku*, or *tanbaku*, *tūtūn*. In a good year 10 paimans of land (one paiman = 100 square yards) will yield one thousand (1,000) to twelve hundred (1,200) mands of *tanbaku*.

(Signed) HAIDER ALI KHAN of SHIRAZ.

Shiraz, April, 1890.

[Enclosure II.]

Mr. Wright, late head gardener to his Imperial Highness the Zil-é-Sultan, considers that *tanbaku* is the ordinary tobacco plant, and that the difference between the *tūtūn*, used principally in this country for cigarettes, and *tanbaku*, used for smoking in the *ghkālīān* or water-pipe, consists in the fact that the *tūtūn* is almost exclusively grown in the moister climate of the Rescht and the rice-growing districts. The *tanbaku* is produced in a very dry district, where dew is absent. The leaves are stripped before they become yellow, laid out singly to dry in the sun at about 140° Fahr., and then closely packed into skins. The Shah's *tanbaku*, which is of a specially fine quality, grows in a very limited district known as Hakūn or Hākān, at the foot of the mountains some 14 miles from Shiraz. This ground is irrigated by a stream of very brackish water (*Āb é shūr*) and the natives attribute the superiority of this particular sample entirely to that cause. Cotton and grapes grow to great perfection in the same region. This peculiarity of water greatly affects other products, for instance, at a place a few miles from Ispahan, melons of a specially luscious flavour are found, the seeds of which, sown in the garden of the Zil-é-Sultan at Tehran, where the water is sweet, produced melons entirely devoid of their native distinctive flavour. The inhabitants of the district are well aware that the same melons cannot be produced elsewhere, and attribute this circumstance entirely to the water, which is so strongly impregnated with salt as to be undrinkable. After the *tanbaku* is packed in the skins no fermentation takes place. As required for use the leaves are taken out and beaten with a sharp-edged mallet. The broken leaf is then sifted, the coarse pieces, such as the ribs, and the snuffy dust being rejected. The preparation of the *ghkālīān*

for smoking is a work of some technical detail. The *tanbaku* is moistened with water and then pressed, *secundum artem*, into the *ghkālīān* "head" not too tightly or too loosely. Live charcoal is then placed on the *tanbaku* and the pipe is ready, the smoke being drawn through the water in the body of the pipe into the mouth of the smoker.

(Signed) J. HORNSEY CASSON.

Tehran, 16 May 1890.

Dr. CASSON to ROYAL GARDENS, KEW.

MY DEAR SIR,

Tehran, 24th December 1890.

THREE days ago I received from the Nawab Haider Ali Khan of Shiraz, the promised specimens of fruit, flower, and seed from the Shiraz district, which I have much pleasure in sending on to you, through the Foreign Office. I hope our messenger will make his way safely over the mountains to Rescht; there is a very deep snow, and at an altitude of some 12,000 feet it is no easy or safe journey. A year ago I was lost at the highest spot for eight hours in a snow drift, having under my charge a poor widowed lady, with her two young babies, on her way home after the death of her husband. On that occasion our courier lost the dispatch bags for four days in the snow! However, I hope these specimens may reach you safely and be useful. I have not translated the writing on the packets, as they are only the addresses of the Nawab at Shiraz; each of the bags, however, is inscribed *Tockhin é Tunbaku*, "seeds of *Tumbaku*." So you may depend upon the authenticity of the specimens.

I shall be interested to hear the result of your researches.

Yours, &c.

D. Morris, Esq.

(Signed) J. HORNSEY CASSON.

The material sent by Dr. Casson required a good deal of soaking and manipulation before it could be brought in to a form in which it could be compared botanically. This, however, having been done, the conclusion was incontestable that the plant of the Shiraz *tunbaku* was nothing more, as had indeed been expected, than ordinary *Nicotiana Tabacum*.

CXCVI.—BOTANICAL ENTERPRISE IN THE NIGER PROTECTORATE.

The following geographical account of the Protectorate is extracted from the Colonial Office List for 1890, p. 299:—

"The British Protectorate over the entire basin of the Lower Niger, including the Benin and Cross Rivers, was formally assumed in July 1884, when regular treaties of protection were concluded by Consul Hewett with all the principal Chiefs. It extends along the coast of Africa from the Benin River (where it joins the boundary of Lagos), to the mouth of the Rio del Rey at 9° east longitude. Inland, the Protectorate includes the whole basins of the Lower Niger and Binué up to and beyond the Boussa rapids on the former, and Jin on the latter, in

about 10° north latitude. * * * * The whole of these vast districts are under the general supervision of the British Consul for the Bights of Benin and Biafra, but on the 10th of July 1886 a Royal Charter was granted to the Royal Niger Company (formerly the National African Company, Limited), by which extensive powers of administration were conferred upon them in the territories over which they have treaty rights, including a belt of 30 miles on each bank of the Niger and Binné. The operations of the Company extend as far inland as Gando and Sockatoo, with the Sultans of which countries treaties have been concluded. The Company's operations on the sea coast are mainly confined to Akassa, the Nûn entrance to the Niger."

The original trade both of the Niger Protectorate and of other West African possessions was in the natural products of the country. As long as this was the case European occupation was practically limited to the trading stations on the coast. As the interior has, however, been gradually opened up there has been a marked disposition to utilise its physical resources in the growth of every suitable kind of tropical produce. It is upon the development of this policy that the material progress and peaceful prosperity of these countries must ultimately depend.

The *Kew Bulletin* for September 1890 contains (pp. 195-199) a memorandum drawn up by the Assistant Director, in the first instance for the Royal Niger Company, but subsequently somewhat expanded so as to cover the cultural industries of West Africa generally.

The Royal Niger Company has on various occasions applied to Kew for assistance in turning to commercial account the natural products of its territory, many of which were little known in trade. In 1889 it was supplied with two picked men, George Woodruff and Harold Edmund Bartlett, from Kew, to take charge of the botanical stations which it had established in the interior.

The gardeners at Kew are specially trained to fit them for such appointments. The Royal Gardens have, in fact, always been an advanced technical school. Each gardener is admitted for a two years' course, during which he has the opportunity of seeing every kind of cultivation carried on in the establishment, and in addition obtains systematic instruction in scientific subjects connected with his profession. The best men receive appointments as opportunity offers, and they are now to be found in every part of the world.

It has always been the practice to keep up as far as possible an informal correspondence with the Kew men abroad and in the colonies. The moral influence of feeling that there are people at home who take an interest in the details of their work, and their success in performing it, is obvious; and Kew can materially smooth matters for its *alumni* when they find much in the conditions of horticulture in the tropics that is strange and unfamiliar to them, by giving the advice suggested by long experience in dealing with such difficulties.

In the case of the two men sent to the Niger Protectorate, the Royal Niger Company unfortunately set its face against their carrying on a correspondence with Kew. This seemed a short-sighted policy, as the Company had obviously everything to gain by such assistance as Kew could give to the men in its employ.

Both men unhappily have died, the last at the commencement of the present year. No blame, however, of the slightest kind can attach to the Royal Niger Company for this untoward result. It is evident that it did everything in its power to promote the health and comfort of the Kew men.

But it seems only just to place some account of the work in which they perished on record. If Kew sent them to Africa where they met their death in the attempt to do something to extend the resources of the empire, it may at least rescue their names and memory from complete oblivion.

The letters printed below were, as will be seen, not in any way official but were addressed to former fellow gardeners at Kew. They are interesting as showing the type of men that the Royal Gardens turn out; the plucky way in which they face their difficulties, their loyalty to their employers, and the kindly feeling they entertain towards Kew. Beyond the omission of purely private matters, the letters have not been edited in any way.

ROYAL NIGER COMPANY to ROYAL GARDENS, KEW.

Surrey House, Victoria Embankment, W.C.,

24 January 1889.

DEAR SIR,

SOME time ago you thought you might be able to find for us an intelligent young gardener who would be willing to go out to the Niger territories to take charge of the botanical work at Asaba. We have, during the past year, made as considerable progress as could be expected without the assistance of a trained gardener. If you could now recommend me anyone I should be much obliged. Perhaps you could suggest the terms on which he would go. His residence would be at Asaba, where there are a considerable number of Europeans, as it is the seat of the Supreme Court of the territories, and also the head-quarters of the constabulary force, which is officered by Europeans. It is reputed to be one of the healthiest places in the Niger territories, so that any candidate for the post should be informed that the climate is entirely different to that of the swamps of the West Coast.

I am, &c.

(Signed) GEORGE TAUBMAN GOLDIE.

D. Morris, Esq., M.A., F.L.S.

ROYAL NIGER COMPANY to ROYAL GARDENS, KEW.

Surrey House, Victoria Embankment, W.C.,

31 July 1889.

MY DEAR SIR,

MR. THISELTON DYER and you will be glad to hear that Woodruff is getting on capitally at Asaba, and seems to take great interest in his work. Do you think you could find us a second man of about the same calibre? We should be so greatly obliged if you could.

I send you a copy of our annual report to our shareholders, so that Mr. Thiselton Dyer may see that we have not forgotten to make our acknowledgments to him for his kindness.

Yours, &c.

(Signed) GEORGE TAUBMAN GOLDIE.

D. Morris, Esq., M.A., F.L.S.

EXTRACT from the Annual Report of the Royal Niger Company
for the Year ending 31st December 1888.

WITH the valuable assistance of Mr. Thiselton Dyer, Director of the Royal Gardens at Kew, the Council have established a public botanical plantation, on a small scale, at Asaba, where experiments in the commercial botany of the territories are conducted, and from which it is

intended that suitable plants and seeds may shortly be supplied at a moderate price to native and European cultivators and settlers. They have also established in the neighbourhood of Abutshi a second experimental administrative plantation for the growth of coffee and cocoa, for the purpose of similar distribution to all who may desire to cultivate those products.

ROYAL NIGER COMPANY to ROYAL GARDENS, KEW.

Surrey House, Victoria Embankment, W.C.,

SIR,

19 September 1889.

I AM desired by Sir George Goldie to ask you to be good enough to inform Mr. Thiselton Dyer that while the plantation No. 2 at Abutshi, to which Mr. Bartlett is specially going, and which contains a large quantity of cocoa and coffee plants, is very successful, the experimental plantation No. 1 at Asaba, in charge of Mr. Woodruff, has so far not proved satisfactory owing to the too great dryness and lightness of the soil at the latter place. Instructions have therefore been sent to the Agent-General to transfer plantation No. 1 as soon as possible from Asaba to the more loamy soil at Abutshi, rather lower down river and on the opposite side, where Mr. Woodruff will manage it as heretofore. Mr. Woodruff and Mr. Bartlett will thus be close neighbours, and will have the advantage of each other's mutual advice, while each will have his independent plantation to look after, and will thus be spurred on to make it a success.

Meanwhile, as the failure has largely affected the tobacco plants, Sir George Goldie will be greatly obliged if Mr. Thiselton Dyer could kindly supply a second set of tobacco seeds similar to those already sent, and of which I append a list.

I am, &c.

(Signed) FRED. W. BRETT.

D. Morris, Esq., M.A., F.L.S.

LETTER from H. E. BARTLETT.

c/o Royal Niger Company,
Akassa, West Coast of Africa,

November 3, 1889.

DEAR —,

I WENT ashore at Sierra Leone, as you know I intended doing, and I found much to my surprise that the place is very different from what I imagined it to be. A hundred years and more of British rule have had their results, and, as a consequence, Sierra Leone boasts of many of the refinements of civilisation; artisans and mechanics of all descriptions ply their respective trades; and in the stores and shops nearly everything is obtainable. The price charged is not nearly so exorbitant as might be supposed, although some articles run expensive. Thus, a watchmaker charges 2s. for putting in a fresh glass, and a poor glass at that. A glass of lemonade ran me 9d. The population is of course all black. There are a few resident whites, but black par excellence is *the* colour, and there is quite as much difference between the "classes" as is observable at home. The educated natives speak English beautifully. A lawyer came on board and went as far as Cape Coast Castle, and it was a positive pleasure to hear that man speak; and he, in colour, was almost ebony black. I was disappointed in my wish to see Mr. Lewis (who has formed extensive plantations here), as

he is still in England. I visited what is by courtesy termed a Botanical Garden. It is situated some distance from the town, and is the most abject, forlorn, and neglected looking place it is possible to conceive. It is, in fact, a barren wilderness, unproductive, uninviting. On my way I saw hundreds of those black ants similar to those that came in a Wardian case to Kew some time ago. They are very venomous. The rains here are very heavy, a fact sufficiently indicated by the deep gullies and watercourses which are everywhere to be seen. I had some personal experience of their character, for it being yet the rainy season I encountered one tremendous driving storm of rain in going back to the ship.

After leaving Sierra Leone we kept the coast continually in sight, and many times I thought of Monteiro's description of it in his book, "Angola and the River Congo." The coast-line is low, flat, depressing; no hills or cliffs rise to break the dreary monotony, and this coast is washed by a tremendous surf; a long white line of breaking surf being visible for miles. The next place I went ashore at was Accrá (accent on the second syllable), and here I had the extreme pleasure of landing for the first time on a surf-beaten shore. The sensation is grand, exciting, perilous. The surf boat shoots suddenly into the midst of the boiling surf. The natives seize you and bear you on their shoulders high and dry to the beach. I have not much to say about Accra. It is made up principally of native mud huts, with the addition of some houses of European residents. I paid a visit to the Rev. Mr. Freeman, a retired missionary, who, at one time, was a gardener in England. He is now living in patriarchal style, surrounded by children and grandchildren. In his little garden he has vines, tomatoes, garden egg, cabbages, parsley, and other things growing more or less luxuriantly. Tomatoes flourish abundantly. After leaving Accra the coast-line got lower, more flat and depressed than before. Here and there, at scarce intervals, little mission and trading stations showed like oases in the surrounding dreariness. Looking at this interminable monotonous prospect one sighed for the bold cliffs, the verdurous hills and pleasant smiling valleys of Madeira; lovely Madeira, "where every prospect pleases and only man is vile," and man is sometimes very vile in this earthly paradise.

It was on Wednesday, October 9th, that I landed at Akassa. The passage out was a quick one, occupying 26 days, and was not marked by any episode of more than usual interest.

Akassa is the depôt through which everything passes on its way up river. It consists of two dwelling-houses, one for the white men and one for the black clerks, and a long line of stores, and a billiard room. Here I spent 10 days, waiting to be sent up river, and on Sunday, 20th, I started on board the steamer "Kuka." The river Niger was now at its full tide. It was the close of the rainy season, and the river had risen 40 feet from its level in the dry season. The Niger delta covers an immense tract of country, and all this district was in a state of inundation; enormous volumes of water rushing out by every availing creek and river, and it is here that the mangrove swamps abound. The mangroves give a weird, fantastic appearance to the jungle; their white interlacing stems and roots forming an impenetrable barrier, through which no human being could force his way.

The navigation of this delta is very difficult, very intricate. The creeks run into each other and communicate in every imaginable manner, forming a maze, a network of water-ways through which it takes a careful pilot and an experienced one to find his way. A stranger

entering these creeks without a trustworthy pilot must inevitably be lost. While I was staying at Abassa the British man-of-war, the "Alectro," came in to go up the river on some diplomatic business, and a captain of one of the Company's boats was sent as pilot.

As we went further up the river the vegetation slowly changed its character. The country still continued level, but in place of the mangroves, which almost wholly prevailed when we started, cocoanut and oil-palms (*Elæis guineensis*) began to make their appearance, and as we proceeded the giant silk-cotton tree (*Bombax*, sp.) reared its colossal head high above the surrounding vegetation.

While the Niger flora seems to be wanting in that lofty grandeur which one almost involuntarily associates with the tropics, yet the compact and dense masses of palms, alternating and intermixed with trees of a sturdier habit, from whose branches hang pendant climbers, give the scene a charm peculiarly its own. The eye looks in vain for a bold striking effect, and is, perforce, content to pick out and admire the individual beauties of leaf and frond and stem.

After getting past the creeks of the delta, we emerged into the Niger proper. Here the true width and volume of the river was at once manifest. We were on a rolling, rushing flood, of width varying from two to six miles. Not a bank to be seen. They are all covered by the expanse of water. Like a huge lake the river looked, and hurrying on to split up and divide itself among the countless creeks that compose the jungle delta, and thence ultimately to find its way to the sea. It is while the river is at this flood that banks are swept away, and even native towns entirely obliterated. The native always builds close to the water, for here he grows his little plantation of yams and plantains, and does his little fishing. It was about the second day that I for the first time understood what a tornado really meant. The steamer was towing a steam-launch which was moored amidships. In it were three men. In the middle of the afternoon a tornado struck us with fearful and unexpected fury, making the ship to reel and lifting all light articles and popping them overboard. The fury of the wind and rain was terrible. Suddenly there came a dreadful cry from the side and rushing over we saw the steam-launch rapidly sinking. It was incredible the quickness with which she went down. Two of the men managed to scramble on board, but the third, the engineer, was washed away. The surf-boat was at once manned and sent after him, but the poor fellow was lost. The rain fell in torrents. Within 15 minutes from the commencement the tornado ceased, and all was over.

It took three days to get to Abutshi, where I am at present. I found Woodruff here. He has shifted from Asaba, as the latter place is totally unfit for a botanic station, the soil being mostly sand. Consequently he has started here, and has made good progress. The plants and seed I brought out arrived in excellent condition except *Eugenia malaccensis*, which had lost all its leaves. As we have others, that will not matter. There is not as yet much variety in the station, but time will improve all that; coffee doing very well; cocoa fairly. *Bixa orellana* (Arnotto dye), cotton and jute, all seem to take kindly to the soil. I am staying here with Woodruff at present, as before said, but we shall not be together for long. Plans are not definitely settled yet. The work of the day commences early out here, and also all over the West Coast. At half-past 5 the bell rings and all the "boys" (boys is the name general to all the black labourers) turn out and work until 10, when they stop an hour for "chop," turning to again at 11 and working on

till 6 p.m., when the bell rings. That, in effect, means working from dawn to dark, as it is soon dark after 6 p.m.

We have to keep much the same hours, but having a little different arrangement for meals; thus, after turning out the boys, or before, if we prefer it, there is early tea. Breakfast at 10, lunch at 2, and dinner at 6.30. So far I like the life very well. Of course there is always the contingency of fever to guard against. I had my first attack last week, but it was soon over, and in two days I was out in the plantation again. The worst time of the year is now approaching, the dry season.

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Limes, the fruit of *Citrus acida* are largely used for making lime drinks, which are both cooling and refreshing. I must close up my letter within the compass of this sheet, or I shall exceed the half oz. postage, which I must ask you to pay this time. I hope to alter this state of things when I send again. We have no stamps here. You will see I have written to both of you, that will save postage, especially as you live together. Please remember me to K——, and show him this letter.

H. E. BARTLETT.

LETTER from H. E. BARTLETT.

c/o Royal Niger Company,
Akassa, West Coast of Africa,
March 16, 1890.

MY DEAR —,

I MUST thank you very heartily for your interesting letter with its news of Kew and Kewites. Oh! the palmy days at Kew as you are so fond of remarking.

I was very much gratified and flattered by the invitation to write a paper for the Kew Gardeners' Mutual Improvement Society, and should like to have done so, but for three sufficient reasons could not.

Firstly. I did not get your letter until nearly February, thus not leaving time.

Secondly. I was in a very precarious state of health at that time and had been for two months. I did not lay up at all. I superintended all my little operations and works all the time, yet I had a terrible struggle with the climate. I kept up a stout heart and pulled through, but was near going under.

Thirdly. And more particularly I do not know to what extent I might compromise myself by writing home any account of the territories or Company's doings. My agreement talks glibly of heavy fines, as you know.

Well, I suppose you will be interested in my welfare, and so will try to let you know how I am getting along. I have got about 1,000 acres of land which has to be all opened up and planted. The name of the plantation is the N'Kisi Creek Plantation, so named after the N'Kisi River which runs through it. I have nearly 100 men at work on the estate at present. Labourers from Lagos, men very ignorant, who have to be shown everything. I am living on the plantation in my own house built by myself; that is, by my men under my directions. The house has two rooms, and verandah running all round. The walls are of mud, the floor ditto, and the roof of palm leaves (*Raphia vinifera*), prepared for that purpose. The rafters are of mangrove wood. At the back, but separate from the house, is the store-house, bath room, kitchen,

and servants' room. I have two servants, both black—cook and house-boy. At the back of this, again, I have a little garden, in which I have planted peppers (Chilis), tomatoes, the Granadilla, sour sop, the Papaw, &c.

So you see my domicile is composed entirely of native materials. The palm leaves are fastened on with "tie-tie," a kind of cord or rope obtained from *R. vinifera* in common with the mats. It is a jolly house, situated on the top of a hill, with a splendid clear view of the Niger, from which a breeze frequently blows. It is always cool and comfortable in the house even under the fierce glare of the noonday sun. I am as comfortable as a king, and as happy as a sand boy, always remembering the sage axiom of Carlyle that happiness is obtained not so much by increasing your desires as by reducing them. I am now enjoying very good health, and can pummel the recalcitrant members of my crowd with ease. Living alone as I do, away from the stations amongst my crowd of "boys" (boys is the term used indiscriminately when speaking of labour here), men who are unscrupulous, and would take the instant advantage of their boss if it is possible, it is necessary to keep the whip hand of them, to be firm and *be* master.

I have learnt many things during my short sojourn in this land of Goshen. I have had to work pretty hard nearly the whole of the time I have been out. I work for my own credit you understand. I want to keep up the good old name of Kew, too, if I can. We are early birds. We turn out between 4.30 and 5. At 5 I have coffee and a snack of something. At 5.30 I ring the bell, and the day's work commences virtually with daylight. The men work on until 11, and turn to again at 12, working until 6. I have breakfast about 11, and dinner at 6.30, and 8 o'clock is time to turn in.

I am dreadfully busy just now. About 20,000 coffee and cocoa plants and 130 pods of cocoa seed arrived three days ago from Lagos as a first instalment for plantation, and there are more coming; that means business. We are going to do our level best to make the estate a big thing. I am pretty well armed in case of trouble any time. I have 21 rifles, a revolver, and about 400 cartridges by me. This morning being Sunday I had a little shooting practice; I am getting to manage the revolver very nicely. Rifles are not new to me.

With regard to climate, just now it is comparatively cool, as there are rains and tornadoes; but until quite recently it has been blazingly hot. The heat in the middle of the day is simply immense. I never stray far from the house or expose myself to the sun at any time without wearing my pith helmet. People at home may scoff at the helmet, but it is with the majority an indispensable article in the tropics. I could not stand the sun a day without my helmet.

Another matter will interest you. When I left England I was a teetotaller and a non-smoker. I am neither now. 'Tis true I drink scarcely anything; it is not obtainable. I do not think a man is any better in the tropics for teetotalism; abstinence by all means. Smoking also, in some degree, mitigates the plagues of Egypt as represented here by mosquitoes and sandflies.

The plants I took out are doing very well. The coffee plants at Abutshi are very promising. Cocoa and cotton likewise show up well. Woodruff is planting *Sansevieria* hemp now. I have been looking after the two places lately. Woodruff has been away after coffee and cocoa plants and seeds. Going to Lagos, Fernando Po, &c., &c., I travel by water, per canoe, but occasionally ride. You remember in the economic lectures, Jackson [Curator of the Kew Museums] said that the mango fruit tasted of tow and turpentine. Well, there is a decided flavour of

those ingredients; but for all that the fruit is delicious. I am *great* on mangoes; the turpentine taste is only just as you bite the fruit; as soon as you have got a fair grip you lose the initial bad flavour.

The sour sop is a favourite fruit of mine, with its acid taste. I do not object to a pine-apple now and then. It would surprise you to see the reckless way we knife a pine. I have half a dozen hanging in my verandah now; they are very nice. The Niger region, as represented by this district, is not a gay place at all. Nature wears a somewhat solemn face; and there are not many flowers wasting their sweetness on the desert air. There is a striking lack of both flowers and fruit. In out of the way shady, watered creeks and bush many beautiful flowers have their home, but these require searching and finding. I hope to make some contributions to Kew after I have "written my name" on the plantation.

It is now Wednesday, March 26th. I must try and finish your letter. I am just a trifle busy now, having received 25,000 coffee and 10,000 cocoa. You can have no idea how densely stupid the average African is, and how incapable he is of reasoning from cause to effect. My plantation hands are from Lagos, and they know not the use of any tool. It is amusing to see them handle a spade for the first time. I have got them, or rather some of them, to turn a piece of ground something near the mark. Yet, for all, like Mark Twain's jumping frog, they have p'int.

It is curious how quickly they succumb to slight sicknesses. It is not skulking altogether, as they lose their pay when not working. At turning-to time I generally find half a dozen—sometimes more—sick men squatting on my verandah. They all come to me when sick. I give them salts largely, on the principle that if it does them little good it also does little harm.

I have had a lot of African fever since my arrival in this country, but I have never had a real knock-me-down attack. The fever is quick in its action. You feel heavy and tired; then you may or may not be taken with the *cold stage*, shivering and shaking, although the temperature is over 90° in the shade. This for an hour, or several hours, and it gradually passes off, leaving you in the hot stage. You are now burning hot and dry, not a drop of sweat about you; you fall into a semi-unconscious state, and awake to find yourself beginning to perspire. The whole business is over in about four hours, but it leaves a man very weak. Last week I had the fever, as described, three days following.

H. E. BARTLETT.

ROYAL NIGER COMPANY to ROYAL GARDENS, KEW.

Surrey House, Victoria Embankment, W.C.,

11 July 1890.

DEAR SIR,

WE annex copy letter from our Principal Medical Officer in the Niger Territories, giving particulars of the death of Mr. H. E. Bartlett.

Yours, &c.

(Signed) J. M. MACMORRAN,
For the Royal Niger Company,
Chartered and Limited.

PRINCIPAL MEDICAL OFFICER, Niger Territories, to ROYAL NIGER
COMPANY.

Medical Head-quarters, Asaba,
MY LORD AND GENTLEMEN, 18 May 1890.

I AM very sorry to have to inform you that Mr. H. E. Bartlett,
of the Onitsha Plantation, died on May 16, 1890.

Cause of death: Remittent fever; uræmia; exhaustion.

The fever was of a very severe type, known on the coast as blackwater
fever, *i.e.*, a form of remittent fever in which one of the leading
symptoms is the passing of urine of a port wine, or nearly black,
colour. I was in constant attendance on him, and was with him when
he died.

He was buried by the Rev. H. H. Dobinson, of the Church Mis-
sionary Society, who saw him more than once before he died.

I am, &c.

(Signed) W. H. CROSSE,
Principal Medical Officer,
Niger Territories.

The Royal Niger Company,
Chartered and Limited.

LETTER from G. WOODRUFF.

Botanical Plantation, Abutshi,
Niger Territories,

DEAR —,

20 May 1890.

YOU will have heard before this of Bartlett's death, I had just
left him and gone back to Abutshi, and was busy reading your kind
and welcomed letter when the doctor sent to tell us. I never expected
he would be out here long, but I thought he might get home again. He
was sick nearly all the time he lived. Our work is very trying out
here, having to be out most of the day. All other Europeans never go
out but very little in the hot part of the day; but until we are well
established it will be nothing but hard work, and unless a man is a
thorough practical gardener he will find it very hard here, as every-
thing is from the commencement; it is very different to going out
to a place already made for you, and it takes very little worry to make
you sick here.

It will not be so hard in two or three years time. It is not only
knowing your work, but you must know how to manage men and be
able to teach them, as when you get them they cannot use a spade or
anything. I have it hard now, as I am one day at my own place and
one at the other. I am pleased to say I am getting my plantation
to look a little like a botanic garden. It is about $8\frac{1}{2}$ acres, and by the
end of this year I hope to have it most all planted. When the Earl
of Scarborough was here he came through the plantation. He said I
had done wonderfully well in so short a time, and that it was better
than Lagos Botanical Station, or anything he had seen since he left
Madeira, and the plants he said were looking well; he had never seen,
taking the plants all round, anything looking so healthy. While I was
at Lagos for plants, I paid a visit to the Botanical Station, and was well
received by Mr. McNair, the Curator. It looks to be about $3\frac{1}{2}$ acres.

We also went to St. Thomas's Island for coffee and cocoa plants. I
did not see much of the island, but the flora appears to be similar to
the Niger. We have about 23,000 coffee and 27,000 cocoa to be
planted this year at the new place Bartlett started. I have collected

about 4,000 *Sansevieria guineensis*, and planted them; the leaves grow quite 5 feet long, and produce splendid hemp. They are difficult to get, as they are only found here and there like most things out here. I hope some day to have a good turn in the bush, but I am afraid it will be some time before I shall have time enough to go properly into it, so that you must not expect much from me at present. The only things we have not been very successful with are *Cephaelis Ipecacuanha* and *Vanilla planifolia*. During the time I was away for plants they went back; I have just got them round again, and hope they will do better. Tea grows well here; at present we have the six plants sent out of Assam, and I have 12 cuttings struck. They grow without any shade, and keep nice and green. Some of them have made 1 foot of new growth in a month, which I should think was good. We have nearly two hundred of *Piper nigrum* and the Patchouli about the same. *Piper longum* grows very slowly, and will not suit here at all. I have had some seeds from Lagos; they are all up, and some planted out—*Bauhinias*, *Sesbanias*, *Acacias*, *Salvia coccinea*, &c., which will help us in the flower way, but nothing of much value. We are just about commencing the rainy season, when everything must be planted out to be able to stand the next dry season. I expect we shall have to start a cotton plantation this year; I have sent home a sample, although not a good one, as they were late being sown, owing to my shifting from one place to another, and they had not finished their growth when the dry season set in. The tobacco from seed of our own saving from the few plants I managed to bring from Asaba, have done much better this time, and I hope this year we shall get some fine leaves. If we succeed, we can grow two crops in the year. I find that as we get the ground worked more, stones begin to appear; so I expect as we go on we shall have plenty by-and-by. If we get a good lot of stones to keep the soil open a little, we shall be able to grow almost anything. The coffee that we put in last year has flowered a little, and I hope next year to get enough from them for seed. I have this year put in 15,000 seeds to be put out next year; they are coming up very well, so far. They take six weeks to germinate, and in that time they have so many chances of being washed in by tornadoes, &c.

The first part of this letter I wrote while at the other plantation.

At Abutshi, where my garden is, we have plenty of company, as it is the dépôt for everything going up or coming down the river, so that everybody going up or coming down stops here, so that there could not be a better place for a botanic garden, and we are always six in the house, and all very nice men. We live well, better than what you would think in so wild a country. We have coffee at 5.30 a.m., breakfast 10 a.m., luncheon 2 p.m., dinner 6.30 p.m. We have very little expenditure; even our washing is done, for a washman is kept on the place. I saved 100% during my first year, and I expect there are few places going nowadays where you can do that.

The other plantation is quite away from anybody; you have your own house steward, cook, &c., &c., and are master of your own house, and when it is all planted it will be a fine place. The house is built about 100 feet above the river and ought to be healthy. It is when you have to live down among the swamps that it is so trying; altogether, a man can be quite happy out here if he keeps his health. A little sickness out here pulls one down very much.

The way I shade my nursery is this: I have beds made 4 feet wide, leaving a walk 3 feet between each. We then get forked sticks about 3 feet out of the ground, tie bamboos right along the forked sticks; then put bamboos across the top, and cover with palm leaves.

Then, when you want to harden anything to the sun after they are up, just take a few palm leaves off every day or so till they are exposed altogether. They being built so low, a tornado never blows the leaves off, and now that I have had a year here, and know what weather to expect and the best way to sow things I am very successful. I have succeeded with everything I have put in this season so far.

I have not been able to dry any specimens yet, but we have just built a tool shed, seed room and office, so that I hope to dry some next flowering season.

G. WOODRUFF.

ROYAL NIGER COMPANY to ROYAL GARDENS, KEW.

Surrey House, Victoria Embankment, W.C.,

DEAR SIR,

February 6, 1891.

I AM instructed by Lord Aberdare to send you full information as to the regrettable decease of Mr. Woodruff, the gardener from Kew, of which the Company received news by cable on the 19th ult. The written information in question will probably arrive about a fortnight hence, when I shall at once forward it to you.

At present the Company has no news beyond the two words, "Woodruff dead."

Yours, &c.

(Signed) HENRY MORLEY,

W. T. Thiselton Dyer, C.M.G., F.R.S.

Secretary.

ROYAL NIGER COMPANY to ROYAL GARDENS, KEW.

Surrey House, Victoria Embankment, W.C.,

DEAR SIR,

16th March 1891.

I AM instructed to inform you that we have this day received the annexed reports of the regrettable death of Mr. Woodruff from Dr. Crosse, the Company's principal medical officer.

Yours, &c.

(Signed) HENRY MORLEY,

W. T. Thiselton Dyer, Esq., C.M.G., F.R.S.

Secretary.

[Enclosure.]

Asaba, River Niger,

17th January 1891.

I REGRET to have to inform you that Mr. Woodruff died at Asaba on January 2nd, 1891, from blackwater fever, followed by inflammation of his kidneys.

I have to inform you that, before he died, Mr. Woodruff made a will, by which it is arranged that his property is to be sold and the proceeds, together with his balance of wages, divided equally between his sister and his fiancée. As soon as I conveniently can, this will be carried out.

Please let me know what amount stands to his credit in the London books, and should he have left an allotment, perhaps it will be as well to stop it.

His effects may realise about 15*l*.

(Signed) W. H. CROSSE.

EXTRACT from Dr. CROSSE'S Diary.

Dec. 29th.—Mr. Woodruff, at his own earnest request, was removed to Asaba in a steamer, He is very ill, has constant vomiting, which pulls him down very much, has everything he can wish for (as champagne, brandy, soda, unsweetened, milk, &c.).

CXCVII.—ADEN BARILLA.

(*Suaeda fruticosa*, L.)

In the *Kew Bulletin* for March 1890, an account is given of what is known as the Barilla industry. Reference is made to the production of this product at Aden, a subject upon which hitherto little has been known. The following correspondence gives the result of an application to the India Office to procure specimens of Aden Barilla, and of the plant producing it, for the Kew Museum.

INDIA OFFICE to ROYAL GARDENS, KEW.

India Office, Whitehall, S.W.,

24th February 1891.

SIR,

WITH reference to your letter of the 12th July last, I am directed by the Secretary of State for India, to forward you herewith a copy of a letter received from the Political Resident at Aden, and to inform you that the case therein referred to, containing a cake of manufactured Barilla and specimens of the plants from which it is made, has been forwarded to your address.

I am, &c.

(Signed) C. E. BERNARD,

Secretary,

Revenue and Statistics Department.

The Director,
Royal Gardens, Kew.

[Enclosure.]

COPY of LETTER from the POLITICAL RESIDENT, ADEN, dated
8th January 1891.

WITH reference to your Lordship's Despatch to the address of the Government of Bombay, No. 11 (Revenue), dated 30th October 1890, I have the honour to forward to your address a case containing a cake of the Barilla as prepared at Bir Ahmed (near Aden) where it is best made. It is broken in two pieces, but this is a proof of its good quality as the inferior cakes only remain whole.

A rough specimen of the material as prepared for burning is forwarded, and also some specimens of the green plant.

2. The mode of preparation is as follows:—The young green twigs at the ends of the branches are picked and left on the ground in the sun for seven days, at the end of which time they turn black, but are full of moisture. Shallow pans with a diameter of from 18" to 2' are then dug in the sand and the blackened twigs are put into them and then ignited, and allowed to burn for some hours, at the end of which time they become a viscous pulpy mass, which is gently stirred with a stick until

it cools, which it does in six hours, and on the following day the solid cake is removed. Should rain or water fall on the picked twigs they become useless.

3. The bush is now at its brightest and freshest. I have also enclosed some specimens of the flower as at present growing on most of the plants. They were picked on the 1st of January, and the specimens of the plant on the same day.

I have, &c.
(Signed) JOHN JOPP,
Brigadier-General, Political Resident.

ROYAL GARDENS, KEW, to INDIA OFFICE.

SIR, Royal Gardens, Kew, 30 March 1891.

I HAVE the honour to acknowledge the receipt of your letter [R. & S., 152] of February 24, enclosing a copy of a letter received from the Political Resident at Aden and informing me of the despatch to this establishment of various specimens illustrative of the Barilla industry.

2. These specimens have since arrived, and will form a valuable addition to the museum of this establishment.

3. The plant sent by Brigadier-General Jopp proves to be *Suaeda fruticosa*, L., and not, as stated in Mr. George Watt's report, communicated in your letter of August 13, 1885 [R. S. & C., 969], *Suaeda nudiflora*, the so-called "Aden Balsam."

4. The manufacture of Barilla has been the subject of inquiry at this establishment on the part of the Egyptian Government, and I purpose publishing the interesting information now obtained in the *Kew Bulletin*.

I am, &c.
(Signed) W. T. THISELTON DYER.
Sir Charles E. Bernard, K.C.S.I.

CXCVIII.—ASSAM RUBBER FOR WEST AFRICA.

(*Ficus elastica*, Bl.)

COLONIAL OFFICE to ROYAL GARDENS, KEW.

SIR, Downing Street, 20 November 1890.

I AM directed by Lord Knutsford to transmit to you, for your information, a copy of a despatch from the Governor of Lagos on the subject of the *Ficus elastica* of Asia.

I am, &c.
(Signed) JOHN BRAMSTON.
The Director,
Royal Gardens, Kew.

[Enclosure.]

SIR ALFRED MOLONEY to LORD KNUTSFORD.

MY LORD, Government House, Lagos,
13 October 1890.

I HAVE the honour to acknowledge the receipt, direct from India, of three packets of seed of the *Ficus elastica*, as also of an account by Mr. Gustav Mann, Conservator of Forests, of the mode of culture pursued in Assam.

2. For their ready and practical co-operation, may I invite your Lordship to convey to the Government of India the thanks of this Colony.

3. The information supplied is of such general interest and value I have ventured to issue it in extenso as a circular, of which I would ask your Lordship to allow the Director of the Royal Gardens, Kew, to have some copies.

4. The seed received has been treated in accordance with the method employed in Assam in the cultivation of this rubber tree. I trust the experiment will prove a success and justify the trouble I have given.

I have, &c.

The Right Hon.

Lord Knutsford, G.C.M.G.

&c.

&c.

&c.

(Signed) ALFRED MOLONEY.

CIRCULAR.

Colonial Secretary's Office, Lagos,
30th September 1890.

The following correspondence on the subject of the *Ficus elastica* of Asia has passed between his Excellency the Governor and the Right Honourable Secretary of State for the Colonies.

The *Ficus elastica* is distributed over Assam, Java, and probably other Malayan countries; it is cultivated in Malabar, and is the chief, if not the only, source of Assam and Java caoutchouc.

The caoutchouc supplied by this tree is only second in importance as an article of export to that of the celebrated *Hevea braziliensis* of the Amazon Valley.

The tree is of similar growth in almost every respect to the "Abba" tree (*Ficus Vogelii*) of Yoruba, and would doubtless thrive excellently in the moist climate of the West Coast of Africa.

The preparation of the caoutchouc is similar to that of the "rubber" of the *Landolphia owariensis* of West Africa. Such of the milk as flows freely is coagulated by boiling, but the greater part is allowed to dry on the tree, from which it is stripped when sufficiently evaporated to bear handling.

The value of good and fine Assam caoutchouc was quoted in 1887 at from 2s. to 2s. 7d. per pound, and in the quantity annually shipped to the United Kingdom it would appear to compare favourably with the Para Rubber.

The seed of this valuable tree, which has been supplied through the kind offices of the Indian Government, is now being cultivated at the Botanic Station of this Colony, and young plants will be available for the public in a short time. As little or no skill is required in its cultivation it is to be hoped that it will soon establish itself in this Colony and the neighbouring States.

By Command:

ALVAN MILLSON,

Assistant Colonial Secretary,

pro Acting Colonial Secretary.

THE UNDER SECRETARY OF STATE FOR THE COLONIES.

S.S. "Sherbro," at Sea,
29th January 1890.

SIR, I HAVE the honour to request that the Secretary of State for the Colonies may be pleased to invite the co-operation of the Indian Government in the direction of the supply to the Botanic Centre of the Colony of Lagos of some seed of the *Ficus elastica*, also a copy of instructions on the mode of its culture pursued in Malabar.

I have, &c.
(Signed) ALFRED MOLONEY.

COLONIAL OFFICE to INDIA OFFICE.

SIR, Downing Street, 13th March 1890.

I AM directed by Lord Knutsford to transmit to you, to be laid before Viscount Cross, a copy of a letter from the Governor of Lagos on the subject of the "*Ficus elastica*."

Lord Knutsford would be glad if the seed required by Sir Alfred Moloney, together with the information regarding the culture of this plant in Malabar, could be supplied through your Department.

Any expense which may be incurred will of course be defrayed from Lagos funds, and upon application to this Department the Crown Agents will be directed to pay the amount in such manner as the Secretary of State for India may desire.

I am, &c.
(Signed) ROBERT G. W. HERBERT.

The Under Secretary of State,
India Office.

INDIA OFFICE to COLONIAL OFFICE.

(R. & S. 354.) India Office, Whitehall, S.W.,
24th April 1890.

SIR, I AM directed by the Secretary of State for India in Council to acknowledge the receipt of your letter of the 13th ultimo, enclosing a copy of a letter from Sir Alfred Moloney, and in reply to state that the Government of India have been requested to procure, if possible, 1 cwt. of the seed of *Ficus elastica*, and to forward the same to the Governor of Lagos together with the required information as to the culture of the plant.

I have, &c.
(Signed) A. GODLEY.

The Under Secretary of State,
Colonial Office.

Local Form No. 1.

No. Kf. 134.

From GUSTAV MANN, Esq., Conservator of Forests, Assam, to
his Excellency the GOVERNOR OF LAGOS.

SIR, Dated Shillong, the 24th July 1890.

IN obedience to the orders received from the Government of India, I have the honour to advise your Excellency of the despatch of three small bags of rubber seed (*Ficus elastica*), containing about one

pound of seed, by sample post, and to enclose a brief account of the methods employed in cultivating this tree in Assam. I also enclose copy of a letter addressed to the Secretary to the Chief Commissioner of Assam, from which it will be seen that the seed is very small and light, so that probably a pound or two will be found sufficient instead of 1 cwt. as now ordered.

I have, &c.
(Signed) GUSTAV MANN,
Conservator of Forests, Assam.

COPY of LETTER No. Af. 73, dated Shillong, the 21st July 1890, from the Conservator of Forests, Assam, to the Secretary to the Chief Commissioner of Assam.

I HAVE the honour to acknowledge receipt of your office Memo. No. 201/72, dated the 27th ultimo, forwarding to me a copy of the Government of India letter No. 494, and dated the 18th June 1890, and directing me to send to his Excellency the Governor of Lagos, on the West Coast of Africa, 1 cwt. of seed of *Ficus elastica* for cultivation in that Colony.

2. With reference to these instructions, I beg to report that the seed of *Ficus elastica* ripens in February and March, and that I will make the arrangements, if necessary, to have it collected of good quality at that season, but before doing so, I beg to point out that this seed is extremely small and light, so probably a much smaller quantity will suffice to commence with, each of the figs contains about 75 seed, and as 90 figs go to one tolah it will make the number of seeds in one pound 270,000, which ought to be sufficient to begin experimenting with, even though there should be no skilled labour available for sowing it.

3. I have obtained about 1 lb. of seed from Kamrup, which I will send at once to his Excellency the Governor of Lagos by post, and I shall write direct advising the despatch of the seed, and giving a brief account of the methods employed in cultivating the Rubber tree here in Assam; the expenditure incurred is so trifling (six annas), that it is not worth while recovering; the postage on two letters would exceed it.

4. I shall await further instructions before despatching more seed.

BRIEF ACCOUNT of how Rubber Trees (*Ficus elastica*) are grown in Assam.

The seed ripens from January to March, when it is collected as it falls off the trees, and afterwards dried in the sun.

It is, properly speaking, the fruit, and consists of small figs, the size of a pea. These at the time of sowing are broken between the hands, and the seed thus mixed with the particles of the fruit is sown without any attempt to clean or separate the seed.

2. Germination takes place sometimes only three months after the seed has been sown, and as it is very small it must be sown on the *surface* of the soil only, but otherwise just like the seed of any other plants, it requires as much light as possible from above; side shade is an advantage. The seed can be sown on beds, or in boxes or flower pots, but it is most essential that the drainage of the soil be perfect, and that the earth never becomes soaking wet, whilst on the other hand it

should neither be allowed to become thoroughly dry, but be kept always moist.

3. As the seedlings are very small at first they must be treated with great care, and drip from trees above the seed bed must be guarded against; the soil must be kept loose, and open vegetable mould is the best soil.

4. When the seedlings are 2-3 inches high they have formed already a little thickened root something like a small carrot, and can then be transplanted very safely; this should be done on to a properly dug nursery bed, *well drained*, and the seedlings should there be placed about one foot in lines also a foot from each other.

5. After the seedlings have become 1-2 feet in height they are very hardy, and can be transplanted at any time of the year, but as the deer are very much after the leaves of the rubber trees, and to avoid the great expense of fencing in our plantation we have of late years transplanted the young trees a second time in nurseries giving them more room, say, 3-4 feet square each plant, and let them grow until 10 to 12 feet high, when they can be put out into the plantation without fear that the deer will destroy them; they require, however, a strong stake each, as the deer will bend the young trees down with their horns, if not staked.

6. The seed of *Ficus elastica*, where the tree grows naturally in the forests, germinates almost invariably in the forks of trees, 30 to 40 feet and more above the surface of the ground, and the young trees grow in consequence for some 6 to 10 years as epiphytes, after which the aerial roots reach the ground, and increase rapidly in size, until some of them reach a girth of from 4 to 6 feet; they are very numerous, and it is not uncommon at a later age that they are thrown out also from the upper branches 60 to 80 feet from the ground, being first as thin as whipcords, but very soon increasing in size after they have reached the ground; it thus frequently happens that the tree on which the young rubber seedling first germinated, is killed by the more vigorous growing *Ficus elastica*, which in this respect resembles the well known Banyan tree, and is one of the largest growing members of our mixed forest in Assam. It requires an exceedingly damp atmosphere to do well, and therefore thrives best at the foot of the mountains, or on the mountains themselves up to an elevation of 2,000 feet. It is met with also at a higher elevation, but not so vigorous, and at 5,000 feet it is liable to be injured or killed by frost.

7. Seedlings of *Ficus elastica* planted in the forks of trees in the forest are very difficult to attend to, and they in consequence often become dry about their roots, which retards their growth if it does not kill them; for these reasons the rubber trees planted on the ground have grown much better in the Assam plantations, and the latter mode of planting has therefore been adopted almost exclusively; they are not planted, however, on the ground in the common way but on small mounds, 3 to 4 feet high, of earth, and the cut-wood and rubbish close at hand, which suits the epiphytal habit of growth of this tree.

8. These rubber trees can also readily be propagated from cuttings if only perfectly ripe young branches or shoots are used; but young trees so raised never are so hardy as the seedlings, and do not make equally good growth afterwards.

9. To ensure the greatest possible amount of moisture in the atmosphere, the plantations of *Ficus elastica* have been made in the moist evergreen forest near the foot of the hills, through which lines 40 feet in width were cleared 100 feet apart from centre to centre of the lines,

thus having 60 feet of forest standing between the lines; on these cleared lines the mounds for the planting of the seedlings or saplings are thrown up at distances of 25 feet apart, care has to be taken afterwards to prevent the forest trees left standing closing in above, over the lines, and the rubber trees planted on them, which they have always a tendency to do, and which, if not guarded against, is very detrimental to the growth of the young rubber trees. The undergrowth, which springs up on these lines and grows most vigorously has also to be cleared two or three times in the year for the first four or five years to admit air for the young rubber trees, but beyond this, and the putting occasionally some more earth into the mounds, nothing is necessary.

10. The lines on which the rubber trees are planted are cut in an east and west direction, so as to protect the young rubber trees against the strong sun in the middle of the day; the atmosphere also keeps moister in this case than if the lines were cut south and north.

11. High ground is always best, and swampy ground where water lodges should be avoided, but the tree grows very well on alluvial flats on the banks of rivers, even though this be inundated for a few days once or twice in the year.

GUSTAV MANN,
Conservator of Forests, Assam.